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(54) Title: **METHOD AND COMPOSITION FOR REDUCING WEAR IN A CUTTING HEAD OF A TUNNEL BORING MACHINE**

(57) Abstract: A method of reducing wear in a cutting head of a tunnel boring machine, by means of the addition at the cutting head of a foamed aqueous liquid composition, which comprises a foaming agent and a lubricant, the lubricant being selected from the group consisting of high molecular weight polyethylene oxides and bentonite. Preferred foaming agents are anionic and nonionic surfactants. Wear rates of cutting elements of TBMs boring in hard rock are considerably reduced. A wear-reducing foamable concentrate is also described.

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# INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 03/09718

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 E21D9/06 C09K7/08

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 E21D C09K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 99 18330 A (ELLENBERGER PETER ;MBT HOLDING AG (CH)) 15 April 1999 (1999-04-15) page 1, line 19 - line 27; claims 1-6 Discloses the alternatives of bentonite and polyethylene oxide	1-6
X	WO 01 12952 A (ELLENBERGER PETER ;MBT HOLDING AG (CH)) 22 February 2001 (2001-02-22) claims 1-9 Discloses the alternative of polyethylene oxide	1-6
X	US 6 287 052 B1 (HOFMANN PAUL ET AL) 11 September 2001 (2001-09-11) column 4, line 24 -column 5, line 1 Discloses the alternative of bentonite	1-6
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>US 5 443 305 A (HEIERLI WERNER ET AL)  22 August 1995 (1995-08-22)  column 1, line 31 -column 2, line 41  column 7, line 60 -column 8, line 15  Discloses the alternative of bentonite</p>	1-6

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Information on patent family members

International Application No

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